Christian Liberty Nature Reader

Florence Bass

Book 1

THIRD EDITION

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CHRISTIAN LIBERTY NATURE READER

Book One

Third Edition

FLORENCE BASS

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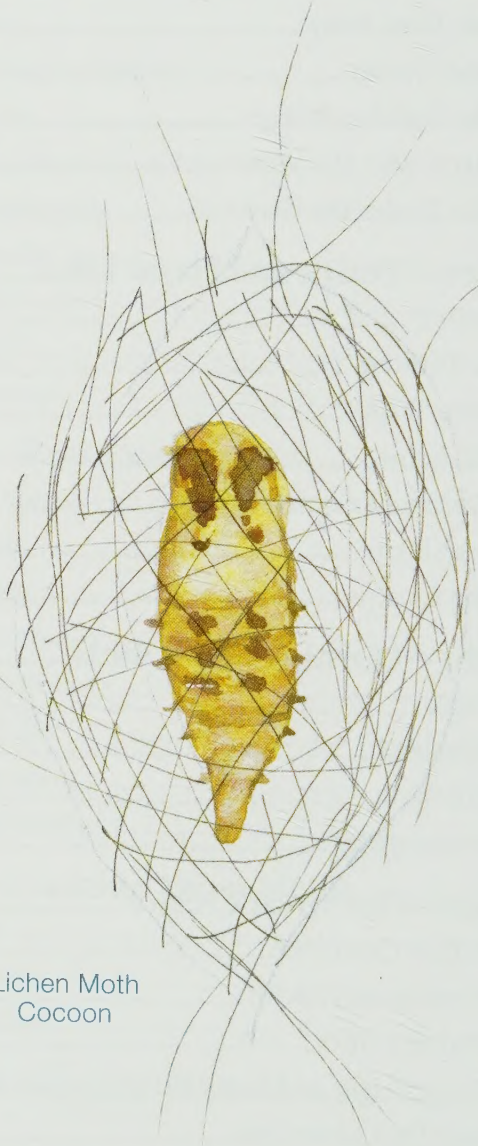


Lichen Moth
Cocoon

Preface

This reader is designed not only to improve a child's reading skills and comprehension, but also to increase the youngster's understanding of and delight in God's wonderful creation.

This text also seeks to expand the vocabulary skills of the reader by way of special drill in the key terms in **bold print** found throughout the book. Instructors are encouraged to make sure that each student understands the meanings of these vocabulary terms in the text. A helpful listing of definitions for the key terms is found at the end of the book under "Words You Should Know."

The Bible says that we are to do "all to the glory of God" (1 Corinthians 10:31). Reading for God's glory necessitates reading material that draws attention to Him and His truth, reflects His majesty, and meets the standards of the Holy Scriptures. What this means is that we should take any reading selection to Philippians 4:8 and ask these simple questions: "Is it true? Is it noble? Is it right? Is it pure? Is it lovely? Is it admirable? Is it excellent? Is it praiseworthy?"

As we look at the American readers of days gone by, we find that the biblical standard was followed. Such readers featured the finest British and American authors, who emphasized honoring God, living to please Him,

enjoying the wonders of His creation, and respecting one's country.

The *Christian Liberty Nature Reader* series follows the pattern of the past. Believing that the student can gain an enhanced appreciation for God by studying His creation (Psalm 19:1, Romans 1:20), this textbook seeks to present the majestic splendor of His handiwork.

It is our prayer that this series will give the reader the joy that is to be associated with "good reading," and that the knowledge imparted will help "make wise the simple" (Psalm 19:7).

The Staff of Christian Liberty Press
Arlington Heights, Illinois

To the Parent

For the first eight to ten years of a child's life, the field or garden is the best classroom, the parent is the best teacher, and God's creation is the best lesson book.

With leaf and flower and tree, and with every living creature, from the blue whale of the deep to the insect the size of a speck of dust, we can learn from each the secrets of its life.

Your goal is to teach your students to see the glory of Christ in all of nature. Take *them* out into the open skies, under the lofty trees, and into the fair gardens. In all the wonderful works of creation, teach *them* to see an expression of God's love.

As John Calvin has proclaimed, "... Wherever you cast your eyes, there is no spot in the universe wherein you cannot discern at least some sparks of His glory. You cannot in one glance survey this most vast and beautiful system of the universe, in its wide expanse, without being completely overwhelmed by the boundless force of its brightness.... This skillful ordering of the universe is for us a sort of mirror in which we can contemplate God, who is otherwise invisible" (*Institutes of the Christian Religion* I. v. 1).

Unit One

Wasps

A Little Mother

Did you ever think about how much your mother does for you? She gives you good things to eat and clothes to wear. She helps to make a pleasant home for you.

God also made mothers for many of His tiny **creatures**. He made these mothers to care for their little ones, just as your mother cares for you.

One little mother is the **mud wasp**. She works very hard. She never seems to stop for a minute. What can she be doing? Just now, she is building a nest. Mother wasp comes with a little ball of mud. She spreads this mud with her jaws. She begins in the middle and spreads it down one side of the nest. Then she darts away.

Mud Dauber Wasp

She has gone for more soft mud. Soon she comes back with another piece. She begins at the top and spreads it out on the other side.

This mud wasp is building her nest. What a noise she makes as she works! Soon she will have one room done.

Mother wasp will then go in and lay a little egg. After that, she must find something for her baby to eat when it creeps out of its egg.

What do you suppose she brings? She brings little spiders! As many as eight spiders may be put in for one baby wasp to eat.

Mother wasp walls up the spiders in a room with her egg. She makes many more rooms like this. Then she flies away and never comes back. She never sees her own little ones. She has given them all the care that they need.

Review

1. Mother mud wasp builds her nest with what?
2. What do baby wasps like to eat?
3. After she walls up each egg in a room, what does mother wasp do?

The Little Children

What happens inside the mud wasp's nest? The eggs she has laid are still at first. Soon it is time for them to **hatch.** A tiny white **larva,** also called a **grub** (grŭb´), creeps out of each egg. It looks like a little worm.

Mud Dauber Grub

A wormlike larva creeps out of an egg? Yes! That is just what a baby wasp looks like. It eats the spiders that its mother left for it. It grows bigger very fast.

After a while, it goes to sleep in a little case. It seems to be dead, but it is not. It is only growing to be a wasp like its

mother. By and by, it wakes up—a full-grown wasp. It does not grow anymore. It bites a hole through its mud house and flies away.

Do you think the wasp knows how much its mother did for it? We cannot tell. We do know that each new mother wasp will care for its own little ones. God the Father made them to follow His plan.

Review

1. What is a baby wasp called after it hatches from its egg?
2. After a while, the white larva, or grub, goes to sleep in what?
3. After the adult wasp bites a hole in its mud house, what does it do?

The Paper Wasp

God made the mud wasp to build her house of mud. Another wasp, the **paper wasp**, builds her house of paper.

Where does a wasp get paper? She does not find it. She does not buy it at the store. She makes it herself!

The paper wasp chews bits of wood off old fence rails or fallen trees. She bites the wood chips into tiny pieces to make paper.

The paper wasp may build her nest under a bridge or the edge of a building. This protects her home from wind and rain.

Each room, or **cell**, in the nest is closed at the top, but open at the bottom. When the wasp has finished working on her nest, she lays an egg in each cell.

Review

1. This wasp builds its house with what?
2. Building a house under a bridge protects a paper wasp's home from what?
3. What does the paper wasp place in each room, or cell, in its nest?

A Social Colony

A paper wasp is different from a mud wasp in several ways. She builds her nest of paper, instead of mud.

The paper wasp is a **social** insect. This means that she is an insect that lives and works with her family. She lives in a colony. A **colony** is a group of insects that live together. The mud wasp lives and works alone. She is a **solitary** insect, which means she lives by herself.

When a mud wasp closes her eggs up tightly, her work is finished. She has given her babies food and a home. They will grow up alone.

A paper wasp does not fly away when her eggs have been laid. She must work hard when her eggs hatch. When the babies, or grubs, creep out, their mother must feed them. She brings spiders and insects for

them to eat. She is very busy finding food for all of her children.

When the babies grow big enough, each cell is closed off tightly. The babies sleep as they change into adult wasps.

Review

1. What kind of an insect is a paper wasp, social or solitary?
2. A _____ is a group of insects that live together.
3. When paper wasp grubs hatch, what do they eat?

The Wasp Babies Grow Up

The baby paper wasps have grown up. They look just like their mother but are much smaller. They do not fly away from the nest. They stay to form a colony.

There is a lot of work to be done. Old rooms have to be cleaned up so the mother (**queen**) can lay more eggs. New rooms must be built. When the next group of eggs hatch, there will be more babies to feed. The queen paper wasp has plenty of help now. Her grown up children, called **workers**, can clean, build, and search for food. If there is danger, the wasps will also fight to protect their nest.

While the **weather** stays warm, the colony grows. When the weather turns cold, many of the wasps will die. Before the winter, a few **females** set off alone. They find cracks or holes where they can hide. While the weather is cold, they do not

even come out for food. They do not need to eat when the weather is so cold.

When the weather grows warm, these females come out. They will build new nests and become queens of their own colonies.

Review

1. Paper wasps grow up and form a _____.
2. Paper wasps will _____ to protect their nest.
3. When the weather turns cold, some wasps will find a crack or hole to _____ .

The Digger Wasp

The **digger wasp** is another hardworking insect. She does not build her nest out of mud or paper. She lays her eggs under the ground.

How does a wasp get under the ground? She digs a hole with her front feet, like a dog! When the hole gets deep, she must carry each piece of dirt up and out, as an ant does. When she finishes her **tunnel**, she lays an egg.

The digger wasp flies away to find food for her baby. She brings back a fat caterpillar. She closes it in the hole with the egg she has laid.

When the egg hatches, the baby wasp looks like a worm. It will eat the caterpillar that its mother has left for food. The baby is safe in the hole. It has plenty to eat until it changes into an adult wasp.

The digger wasp is a solitary insect, like the mud wasp. It grows up alone. Later, it works and lives alone. God made the wasps to live this way. His plan is perfect for them.

Review

1. After a digger wasp digs a tunnel for her nest, she lays an _____ .
2. After a baby digger wasp hatches, it eats the _____ its mother left for it.
3. What kind of insect is the digger wasp, social or solitary?

The Ichneumon Wasp

The **ichneumon** (ik•nū'•mən) **wasp** has a long, hard name. It means "tracker." She is a wonderful **tracker.** The female wasp tracks down larvae of other insects to feed to her own larvae. No hunter or dog could find his food better.

Larvae are the wormlike babies of insects. She lays her eggs in or on them. She has a sharp drill. Sometimes, she uses it to reach larvae inside a tree and lays her eggs on them. When the ichneumon wasp's larvae hatch, they use the larvae their mother laid them on for food.

The ichneumon wasp is a good friend. Many of the larvae that her babies eat are harmful pests. When

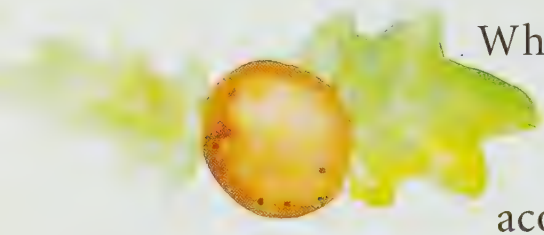
the ichneumon wasp's babies destroy larvae, they save many of our plants and trees from damage.

Review

1. What does the ichneumon wasp's name mean?
2. The ichneumon wasp lays her eggs in or on the _____ of other insects.
3. The baby ichneumon saves many of our plants and _____from damage.

Ichneumon Wasp

The Oak Gall



What is this? It grew in an oak tree, but it is not an acorn. It is the baby **gall wasp**'s little, round house called a **gall**. It is the perfect place for him to grow; it gives him food and a place to live. It has no doors or windows. How can anything get in there? Nothing can get in very easily, but something will come out.

The creature in the house is a baby gall wasp. First, his mother drilled a hole in a branch of the oak tree. Then she placed an egg in the hole. After the egg hatched into a larva, the larva put something very special into its hole. It was a **chemical** that caused a gall to grow.

The oak gall can also be useful to people. We cannot eat it or live in it, but we can make something useful from it. The

chemical in the gall was used to make oak gall ink. The Sinai Bible—the oldest known Bible today—was written more than 1,600 years ago with this ink. How wonderful it is to think that the home of an insect could be used like that! The great Creator God has made this small creature to act in such a way for the good of man.

Review

1. The baby gall wasp's little, round house is called a _____ .
2. A mother gall wasp drills a hole in a branch of an oak tree and places an _____ in the hole.
3. The chemical in the oak gall was used many years ago to make _____ .

The Gall Wasp Hatches

White Oak Gall Wasp Emerging from its "House"

The baby gall wasp, or larva, hatches from his egg. He is still inside the gall. He will begin at once to eat his house. It seems strange, but it is just what he needs for food. How easy for him to eat!

The larva does not have to come out of his house to find food. He eats and eats. Finally, he has eaten enough. He goes to

sleep. While he is asleep, this larva turns into an adult gall wasp like his mother. He is ready to go out into the world.

The gall does not have a door. This does not matter to the adult gall wasp. He knows what to do. He cuts his way through the wall of his house and flies away. He is done with his house now.

Review

1. What does the larva of a gall wasp eat?
2. After the baby gall wasp has eaten enough, he goes to _____ .
3. The adult gall wasp cuts through the wall of his house and _____away.

Unit Two

Other Insects

The Ant

Have you ever watched an ant at work? The worker ant is a busy creature. She is part of a colony. The ants in a colony work together. They gather food. They care for the queen and her babies.

There are many kinds of ants. Ants are insects; they belong to the family

called **Insecta** (ĭn•sĕk´•tə). They have six legs. Their body is divided into three segments. On their heads, ants have two **antennae**, which they use to touch and to smell things. When an ant finds food, she lays down a trail of **scent** back to her nest. Now other ants can follow the trail. Each ant can carry only a tiny bit of food. Together, many ants carry enough food for the whole colony.

Review

1. Ants belong to what family?
2. An ant's body is divided into how many segments?
3. An ant tells other ants where to find food by laying down a trail of _____ .

The Life of an Ant

Each year, many new queen ants fly off to start new colonies. An ant can fly? Yes, the queen ant has wings! When she finds a home, she does not need to fly anymore. She takes her wings off!

The queen ant lays many eggs. Larvae hatch out of the eggs. The queen ant cares for her babies. Soon the larvae **spin cocoons**. In the **pupal** (pū´•pəl) **stage**, they change into worker ants.

When the worker ants come out of their cocoons, they are ready to help the queen. They take care of the eggs and larvae. They dig tunnels and search for food. A busy new ant colony has begun.

Review

1. When a queen ant finds a new home, she takes her _____ off.
2. After the ant larvae spin their cocoons, they change into _____ ants.
3. Worker ants take care of baby ants, dig tunnels, and search for what?

Honey Ants

Ants are the same in some ways. In other ways, ants can be very different from each other. One special kind of ant is called a **honey ant**. The honey ants love sweets.

Some honey ant workers are called **repletes** (rĭ•plētsˊ). The repletes live in a

A Replete Honey Ant Full of Honey

special room. Other workers bring them **nectar** and **honeydew**. The repletes eat and eat. They become huge. They cannot even move! They hang from the ceiling

in their room. Other workers can come to them for food. The repletes are like living honey pots.

When the weather is cold or dry, the ants can still have sweet food.

Review

1. What are the special honey ant workers called?
2. These special worker ants eat a lot of nectar and _____ .
3. These special worker ants hang from the _____of their room.

More About Honey Ants

Honey Ant Worker "Herding" Aphids

Honey ants feed nectar and honeydew to the repletes. The repletes store the sweet food in their bodies. The honey ants gather the nectar from flowers, but where do they get the honeydew? They gather it from tiny green insects called **aphids** (ā´•fĭds). Honey ants take care of their own herds. Their herds are not cows. They are aphids.

Aphids live on plants. They suck the juices from the **stems** and **roots**. Then they make honeydew. The ants get the

honeydew by gently rubbing the backs of the aphids with their antennae.

The ants take care of their herd of aphids. They protect them from their **enemies**. They keep the aphids out of the bad weather. They care for the aphids' eggs. They even carry the aphids from one plant to another when they need more food.

People do not like aphids. Aphids destroy plants such as cotton and sugarcane. Farmers are happy when birds and ladybugs eat the aphids. The ants are not happy to lose their herd.

Review

1. Worker ants gather the honeydew from tiny insects called _____ .
2. Aphids make honeydew when they suck the juices from the _____ and roots.
3. Honey ants protect their aphids from their _____ and bad weather.

The Parasol Ant

Another special ant is called the parasol ant. The worker ants in these colonies grow their own little **fungus** gardens.

Parasol ants cut leaves into big chunks with their powerful jaws. This is why they are usually called "Leafcutter ants". They then carry the leaves over their heads like **parasols**. They find a special place to grow their garden. The ants chew the leaves into **pulp**. The pulp is a perfect place for fungus to grow. Soon the ants have a beautiful garden. They can gather their food very easily.

Did you know that ants could grow a garden? God made them very wisely, did He not?

Review

1. The worker parasol ants grow what kind of gardens?
2. The worker ants cut leaves and carry them over their heads like _____ .
3. To help the fungus to grow, the worker ants chew leaves into _____ .

Honeybees

Here is a little **honeybee** on a big sunflower. What is she doing? She is brushing the flower with tiny hairs on her legs. Yellow dust called **pollen** is on the flower. The bee makes the dust fall off the flower. She has tiny folds on the backs of her legs, like baskets. She catches the pollen in these baskets.

What will the honeybee do with the yellow dust? She will take it home to make **beebread** for the baby bees, which are called larvae. Beebread is made of pollen and honey. The bees live in a **beehive**.

Inside the beehive is the **honeycomb**. It is made up of little **wax** cells. Each one has six sides.

The bees fill many of these cells with sweet nectar. When the nectar dries and ripens, it becomes honey. The bees gather both nectar and pollen from the flowers.

The worker bees are very busy. The food they gather and make feeds the whole colony. Without the worker bees, the queen bee, the **drones** (**male** bees), and the baby bees would die.

Review

1. The yellow dust that worker honeybees collect from flowers is called _____ .
2. What do the honeybees make with the yellow dust?
3. The worker honeybees keep sweet nectar in the cells of the _____ .

The Beehive

The inside of a beehive is an interesting place. The worker bees have many jobs. Some of the bees make the wax cells; the cells make up the honeycomb. The bees also make beebread to fill up some of the cells.

The worker bees all pet and care for their queen. She is the mother of all the bees in the hive. She lays eggs in some cells prepared by her workers. Most of the larvae that hatch from the eggs are fed a little **royal jelly** and then only beebread. They will become workers. A few of the female babies are fed only royal jelly; these larvae will grow up to be queens!

When the new queen bees begin to sing in their cells, the old queen leaves the hive with a group of the worker bees. This is called a **swarm**. They will start a

new colony. When two queens come out of their cells, there is trouble. There can only be one queen in each hive. The new queens fight until one is killed. Then the rest of the bees accept the winner as their new queen.

Bees are hardworking creatures. One of the things they work so hard at is making honey. They need it to live through the winter. Bees make much more honey than the colony will need. Beekeepers gather the extra honey from the hives. People can enjoy the bees' honey, too!

Review

1. The worker bees _____ and care for the queen of the colony.
2. After the larvae hatch, they are fed a little _____ .
3. After new queens begin to sing, the old queen and some worker bees leave the hive in a _____.

A Leaf-Cutter Bee

Not all bees live in hives. Some bees are solitary bees. They build a nest only for their own babies. They do not belong to a colony.

One solitary bee is the **leaf-cutter bee**. The mother bee digs a tunnel under a rock or in a piece of wood. Sometimes, her home is under a **shingle** on a roof.

God has given this bee a special gift. She knows how to cut a circle! She cuts out pieces of leaves. She brings them to her tunnel. She lays them beside one another. She makes them into a **bundle** shaped like a tiny cup. She uses many, many circles of leaf. When she is finished, she lays her egg inside.

The leaf-cutter bee makes beebread from pollen. She leaves it in the nest with her egg. When the baby hatches, it will have food to eat until it grows up.

Review

1. The leaf-cutter bee is a _____ bee that builds a nest only for its babies.
2. The leaf-cutter bee digs a _____ under a rock or in a piece of wood.
3. The leaf-cutter bee cuts _____ out of leaves.

The Cuckoo Bee

Another solitary bee is called the **cuckoo bee**. She has a different way of caring for her babies. To us, it seems like she tries to trick the bumblebee. The mother cuckoo bee can do this because she looks very much like a bumblebee.

When she is ready to lay her eggs, she creeps into a bumblebee hive. She finds a cell that has been prepared by the worker bees. She lays her egg.

The bumblebee is often tricked. It does not know that the cuckoo bee has fooled it. The bumblebee takes care of the cuckoo bee's baby as if it were its own.

The cuckoo bee does not have to do a lot of work to care for her baby. She does make sure that it will have a home.

Review

1. The cuckoo bee looks very much like a bumblebee and tries to _____ it.
2. The cuckoo bee lays her eggs in the hive of the _____.
3. The bumblebee cares for the _____ of the cuckoo bee.

A Carpenter Bee

A little **carpenter bee** flies around the branches of a maple tree. She is very busy. She is building her house.

How can a bee build a house from a tree? Does she saw the branches down? Does she have a hammer and nails to put the sticks together?

No! The carpenter bee has special tools that God gave to her. She does not have to carry away the wood to make her home. She chews right into a branch of the maple tree. She makes a round front room. Down the middle of the branch, she makes more rooms.

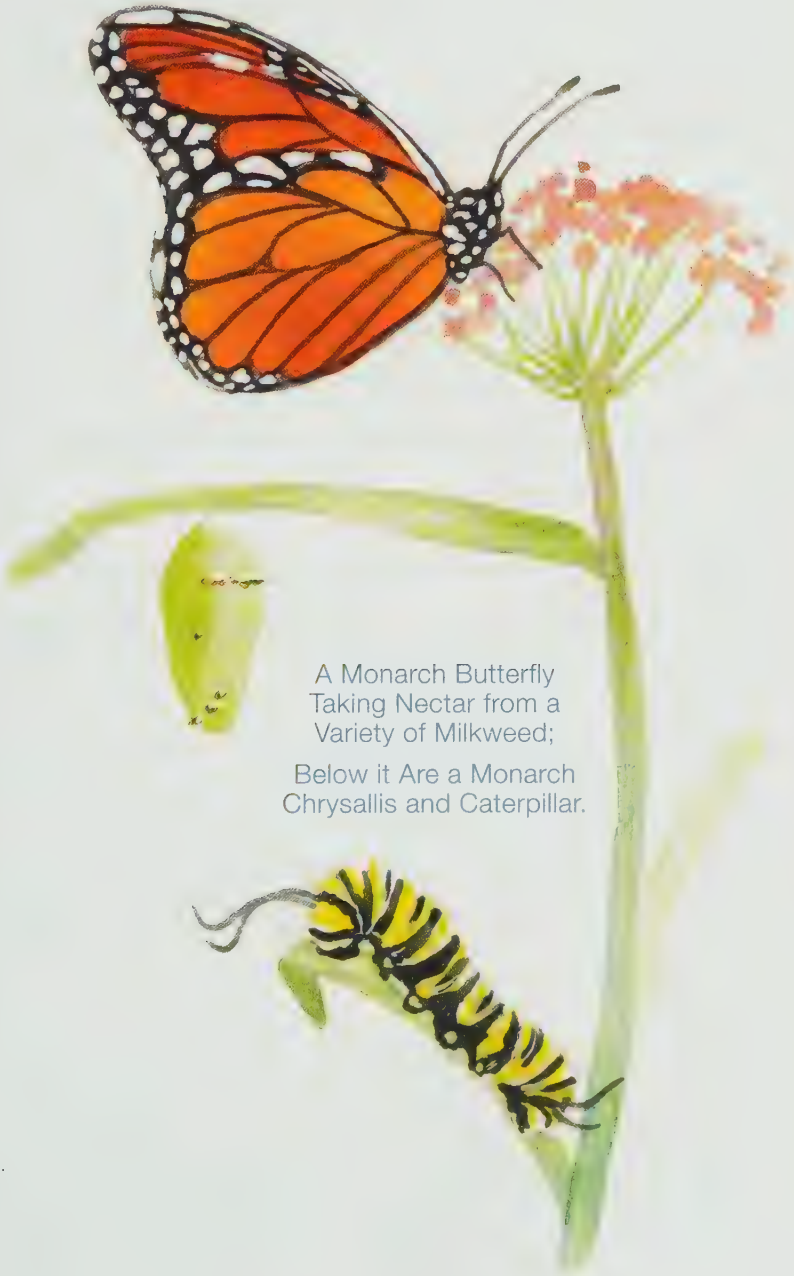
She builds walls between the rooms. She uses the chips made from the chewing of the branch. She has a special glue that she makes herself. She sticks the chips together to make each wall. Each room will be the home for a new baby bee.

Carpenter bees cannot try new ways to build houses like people can. You will not find a carpenter bee making a castle or an apartment building in her tree. She does what God made her to do. She builds a perfect home for her family.

Review

1. The carpenter bee chews into a branch of a _____.
2. Down the middle of the branch, the carpenter bee makes _____.
3. She makes_____ between the rooms by gluing wood chips together.

A Butterfly



A Monarch Butterfly Taking Nectar from a Variety of Milkweed;

Below it Are a Monarch Chrysallis and Caterpillar.

What a beautiful butterfly! He darts around the yard. He is as pretty as the flowers on which he lands. He drinks nectar from the flowers.

The butterfly is an insect. He has two sets of wings. His wings are very **delicate** (dĕ´•lə•kət). Inside them, there are tubes called veins. They help to make the wings strong. If you touch a butterfly, you can damage his wings.

The butterfly was not always so nice to look at. When he hatched from his egg, he was a **caterpillar.** He crawled on trees and ate leaves. As he grew, his **skin** got too tight. The caterpillar split open his old skin and left it behind. He had a new skin all ready under the old one! This happens four times.

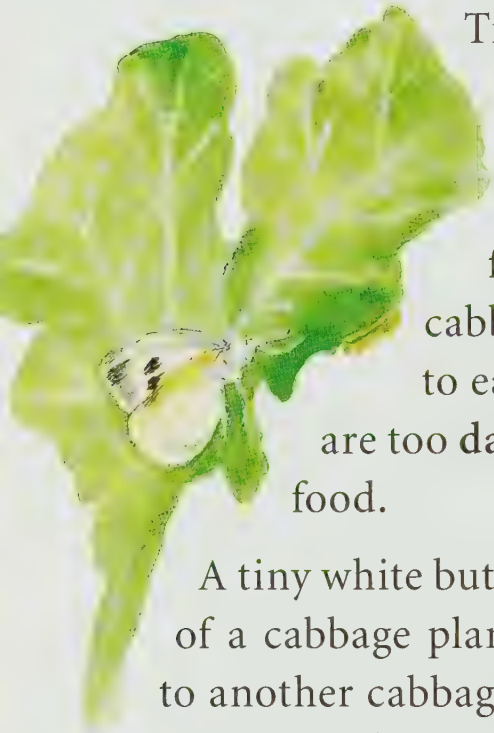
Soon the caterpillar is ready for a big change. His skin splits one more time and shows a new skin underneath that hardens quickly. He is now a **chrysalis.**

After many weeks, he breaks out. He is now an adult butterfly! This change is called **metamorphosis** (mĕ•tə•môr´•fə•səs). What a miracle! Only God could plan such a thing.

Review

1. The tubes in a butterfly's wings are called _____ .
2. After a butterfly's egg hatches, he is a _____.
3. The next stage in the butterfly's life is called a _____ .

Tiny White Butterflies



Tiny white butterflies can often be seen in a garden in the summer. They **flutter** around the cabbages. Do they like to eat cabbage? No, they are too **dainty** for that kind of food.

A tiny white butterfly lands on a leaf of a cabbage plant. Then it darts off to another cabbage plant and stops on another leaf. Each time the butterfly lands, it leaves a tiny, green egg. Later, a little green caterpillar will creep out of each egg. It does not look at all like its pretty mother.

A butterfly's baby is a **greedy** thing. It loves to eat the leaves of the cabbage plant. Its mother knew that a cabbage plant would

be a good place for it to hatch. The little caterpillar eats so much that it grows very fast.

Finally, the caterpillar stops eating. It grows sleepy. A thin, green skin covers it, and the caterpillar has become a chrysalis. After a few days, it breaks out of its covering and flies away. It has become a beautiful, white butterfly like its mother.

It sounds almost like a make-believe story, but it is true! God made these tiny creatures. He gave them their amazing way of growing up.

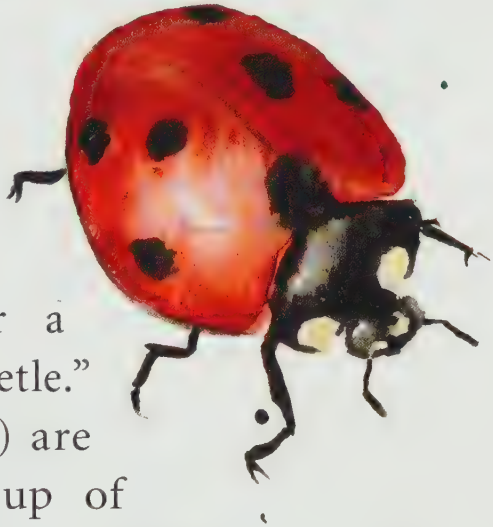
Review

1. A tiny white butterfly lays an egg on a _____ of the cabbage plant.
2. After the green caterpillar stops eating, it becomes a _____ .
3. In its _____ , the caterpillar becomes a butterfly.

Unit Three

More About Insects

A Ladybug



The ladybug is a pretty little insect. Some people call her a "ladybird beetle." **Beetles** (bē´•təls) are the largest group of insects in the world. There are over 360,000 kinds of beetles, and the ladybug is one of them. She often has a red or orange back with black spots. Her brightly-colored back protects her delicate wings. When she wants to fly, she folds her wing covers out of the way.

The ladybug knows how to protect herself. She cannot fight her enemies, but she can fool them. When she is scared, she drops

down to the ground. She curls up her legs and lies very still. Many creatures will leave her alone if they think she is dead.

Some ladybugs have a different way of protecting themselves. When this kind of ladybug is scared, she gives off a bad smell. Her enemy does not want to be near her. He does not want to eat something that smells like that! The enemy goes away. The ladybug is safe.

The ladybug is not just a pretty insect. She is our friend. She never bites or bothers people. In fact, she is very helpful to us.

Tiny green aphids sometimes live on plants. They eat the leaves and make the plants sick. Farmers do not like these bugs. They make it hard to grow crops.

The ladybug eats these **harmful** insects. These aphids are the ladybug's favorite food! She eats as many of them as she can. She saves the plants. She helps the farmer grow the food that we eat.

Review

1. _____ are the largest group of insects in the world.
2. A ladybug protects itself by dropping to the _____and playing dead.
3. Ladybugs help farmers by eating harmful insects called _____.

The Ladybug's Children

When the ladybug is ready, she lays her eggs. Her children do not look like her when they hatch. They are dark-colored grubs with bright spots. Her little ones are like her in one way. The ladybug's children like to eat the same kind of food that she does.

The grubs grow very fast. They need a lot of food. The greedy grubs eat a lot of harmful aphids.

Later, the grubs go to sleep in cases glued to the bottom side of leaves. When they come out of the cases, they will be adult ladybugs.

Ladybugs are so helpful that people sometimes gather them in the winter, when they **hibernate** (hī´•bər•nāt). The farmers keep the ladybugs in a cold place. Then, when their crops are ready, they

spread the ladybugs on their fields. What an important insect the ladybug is!

Review

1. The ladybug's children are dark-colored _____ with bright spots.
2. What do the children like to eat?
3. In the winter, farmers keep ladybugs in a cold place while they _____ .

A Mosquito

The mosquito is an enemy of ours. She has a graceful body, but none of us will ever like her. She is a pest! We do not like her bite.

"Be on guard, m o s q u i t o ! We will fight back if you attack us." We do not enjoy the mosquito at all, but we can still learn something interesting about her. Knowing more about the mosquito can help us. We need to find ways to keep her from living near our homes.

It rained a few days ago. Water filled an old bucket behind the shed. Something is floating in the water. What can it be? It is a whole boat of mosquito eggs glued together. It seems like a strange place for a mosquito to lay her eggs, but the babies

will hatch in just the right spot. Where there is any standing water, a mosquito will lay her eggs.

After a while, little larvae come out of these eggs. Some people call them "wigglers." They wiggle as they swim through the water. How funny they are! They have little hairs at the end of their tails. They breathe underwater through breathing tubes. As they grow larger, they split open their skins and come out. You can see their old skins floating on still water.

Review

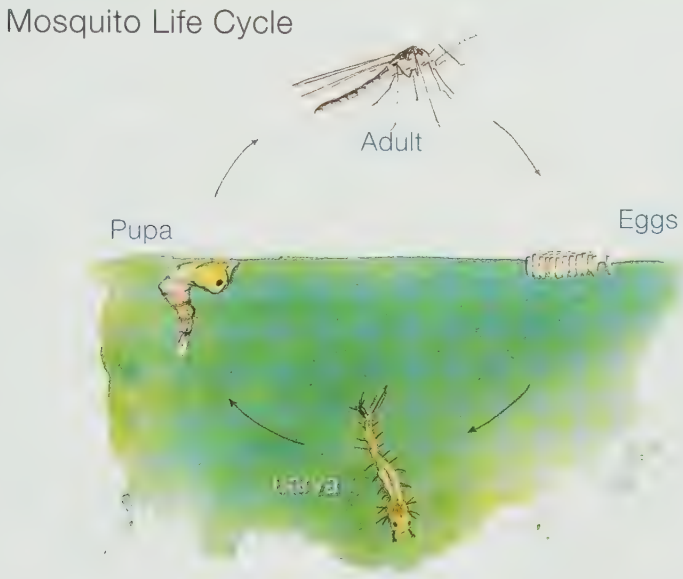
1. We do not like mosquitoes because they _____.
2. Mosquitoes lay their eggs in any _____ water.
3. What are baby mosquitoes called?

The Mosquitoes Grow Up

After mosquitoes hatch, the larvae begin to change over time. Their upper bodies and heads grow bigger. Soon the babies stop eating. They are called **pupae** (pū´•pē). Some people call them "tumblers" because they move by rolling over and over.

Soon the mosquitoes break their skins and come out. They are full grown mosquitoes. They must be very careful while drying their wings. They will drown if they fall in the water. Their birthplace is no longer safe for them.

Now the mosquitoes are ready to bite. Their bites can make us itch. Some mosquito bites can even make people sick. In many parts of the world, mosquitoes carry **germs**. They can pass the germs to people through their bites.

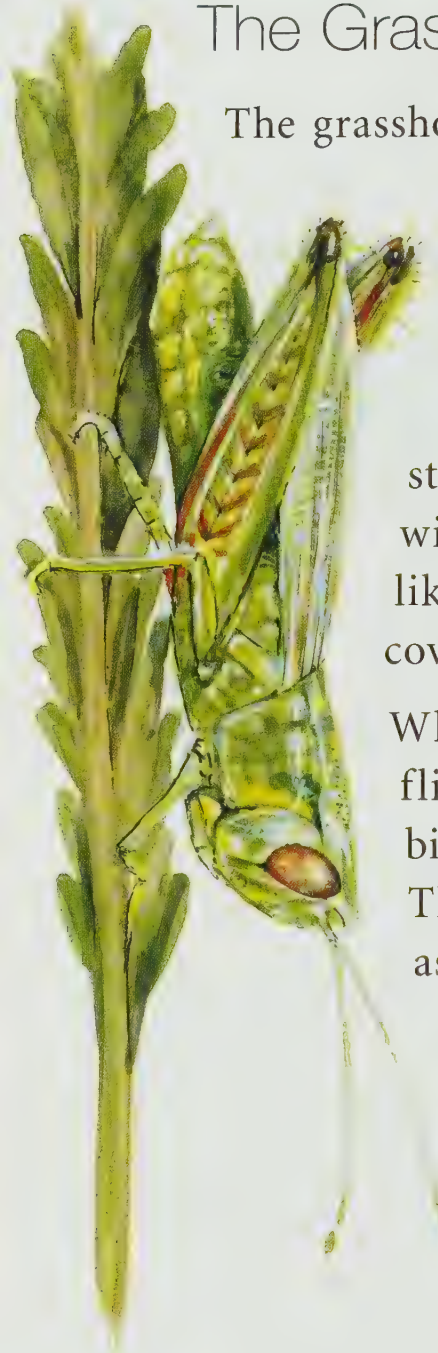


You can help to keep mosquitoes away from your home. Remove any standing water around your home. The mosquitoes cannot lay their eggs in your yard if there is no water.

Review

1. What are mosquito pupae sometimes called?
2. Mosquito bites can be harmful to people because they carry _____ .
3. Keep mosquitoes away from your home by removing any standing _____ .

The Grasshopper



The grasshopper is an insect with long, strong legs. He can jump very far. Many grasshoppers have wings, as well. When the grasshopper sits still, you cannot see his wings. They are folded up like a fan. Long, straight covers keep the wings safe.

When the grasshopper flies, you can see what big, fine wings he has. They are nearly as pretty as a butterfly's wings.

In other ways, the grasshopper is not like the butterfly. When a grasshopper hatches from its egg, it is

not a crawling caterpillar. It looks like a tiny adult grasshopper. The baby does not have any wings.

When the baby grows bigger, his outside gets too small. Soon he splits down the back and steps out of his outside skin. His new skin is all ready under the old one. This is called **molting**. Most grasshoppers molt five times. With each molting, the grasshopper's wings get bigger. When the grasshopper becomes an adult, his wings are fully grown.

The grasshopper is food for many birds, toads, and lizards. In some countries, even the people eat grasshoppers!

Grasshoppers can be very greedy. Sometimes, a lot of them can eat a farmer's whole crop. In the Bible, God used one kind of grasshopper as a **curse**. The insects ate all of the **Egyptians**' (ĭ•jĭp´•shənz') crops when their **pharaoh** (fā´•rō) refused to obey God. God can use

even the smallest, or weakest, of creatures to do His will.

Review

1. After a baby grasshopper hatches, he looks like a tiny adult _____ .
2. As a baby grows bigger, he splits down the back and steps out of his skin. What is this called?
3. In the Bible, God used one kind of grasshopper as a _____ .

The Housefly

The housefly is an insect. It has three body parts and six legs. The fly has sticky pads on its legs. That is why it can walk on the ceiling. The fly has large eyes. It can see on all sides. The fly has two wings. They fold flat against the fly's back when it is not using them.

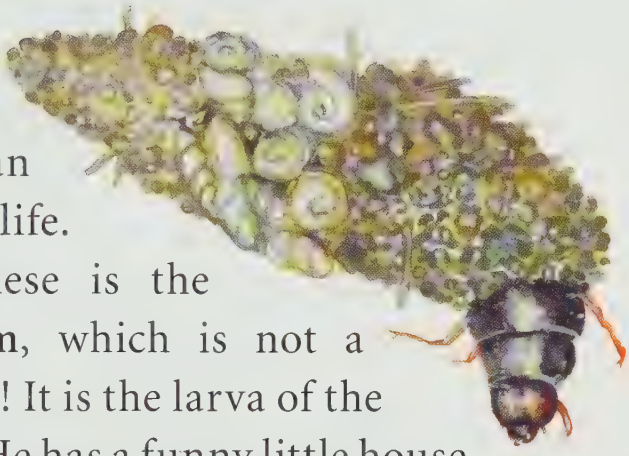
The housefly is a pest. It does not bite us like the mosquito does. It carries germs on its body. When the fly lands, it leaves some of the germs behind. People can get sick from these germs. Stay out of my house, housefly!

Outside, the fly can do some good. It eats garbage and other things that make the air bad. Even a fly has its place in the world.

Review

1. A housefly has how many body parts?
2. A housefly is a pest because it carries _____ on its body.
3. A housefly does some good outside by eating _____ .

The Caddisworm



Many insects live an amazing life. One of these is the **caddisworm**, which is not a worm at all! It is the larva of the **caddisfly**. He has a funny little house. It is made of tiny shells and stones or leftover parts of plants. The caddisworm has a very soft little body. He could not live long in the water without his house. A hungry fish would love to eat him!

The larva of the caddisfly needs a safe place to live. God made him in a special way. He can build his own home. He has to build it right in the water. He picks up little shells or bits of stone, or whatever he can find. He sticks them together with **silk**. He makes the silk himself. It works like glue. It holds his home together.

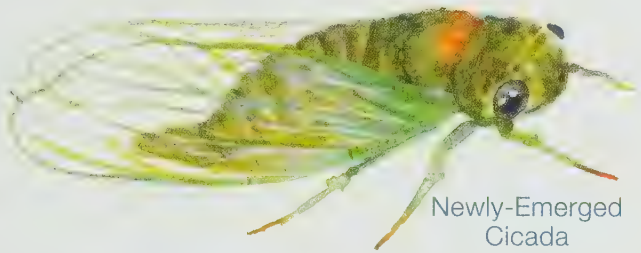
The caddis larva begins his house when he is very little. As he grows bigger, he must keep adding to it. One day, he is ready to change. He puts a little silk door on the end of his house. He stays inside while his body changes. Soon he is no longer a "worm." He grows wings. Then he is called a caddisfly.

Many insects—such as flies, butterflies, and moths—go through a big change. This change is called metamorphosis. These insects begin as tiny eggs, change into wormlike larvae, become pupae, and then become adult flying insects. This is another miracle of God.

Review

1. A caddisworm builds his house with little _____ and bits of stone.
2. The caddisworm holds his home together with _____.
3. Many insects go through a big change called _____.

The Cicada



Newly-Emerged Cicada

The **cicada** is another interesting insect. It lives under the ground for thirteen to seventeen years! How does the insect get under the ground? Why does it want to live there?

First, an adult cicada lays about twenty eggs in a twig. After six to ten weeks, the eggs hatch and the cicada babies drop down and begin to burrow under the ground. They live there for many years. They suck juices from the roots of the tree for their food.

Suddenly, after many years, they know that the time has come to leave the ground. The cicadas drill their way through the dirt and climb up into a tree. They fix

their **claws** into the bark. Then a very strange thing happens. They begin to molt. The skins of the cicadas split open along their backs. The adult cicadas then push their way out of their own outer skins. They leave behind their old skins, which look like little, empty cicadas.

Cicadas are very weak when they first come out of their skins. They have soft, green wings. The cicadas wait and rest. Soon their delicate, green wings get larger. They become harder and turn black.

Now the cicadas can fly among the trees and find a **mate**. The cicada's song is high and loud. You can hear its song on long summer days.

Review

1. An adult cicada lays her eggs in a_____ .
2. Cicada babies suck the juices from the _____ of a tree.
3. When the cicadas come out of the ground, they fix their_____ into the bark.

Not a Locust

Many people call the cicada a **locust**. A locust is a very harmful insect. It causes great damage to crops. In the Bible, we read about God sending locusts as a curse upon the Egyptians for their sin of not obeying Him.

The cicada is not nearly such a pest as the locust, but it can cause damage to fruit trees. When the cicada lays its eggs in the tiny branches, the branches often break. People sometimes wrap their trees with cloth when they know the cicadas are coming.

When cicadas come out of the ground, there can be thousands of them in a small area. They crawl into each tree by the hundreds. It is very strange to see the many, many empty skins that they leave behind, clinging to the branches. It seems funny to us—an insect stepping out of

its own outer skin! God made so many interesting creatures for us to study.

Review

1. God sent locusts as a curse upon the _____ for not obeying Him.
2. Cicadas can damage _____ trees.
3. People protect their trees from cicadas by wrapping them with _____.

Unit Four

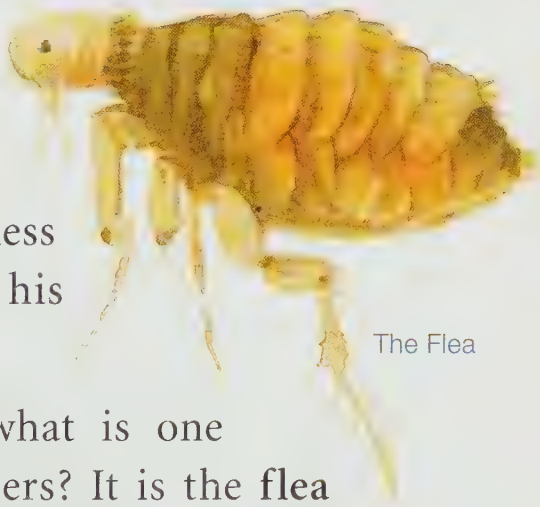
Remarkable Insects

The Best Jumper

"I can jump farther than you."

"No, you can't. I can jump the farthest."

Did you ever hear children talk like that? If a child tried very hard, he might be able to jump six feet. That would be less than two times his own length.



The Flea

Do you know what is one of the best jumpers? It is the **flea** (flē´). He is an odd-looking insect. He has very strong legs. His body is covered with plates of hard, tough "skin." The flea can be harmful to animals and

to people. Still, it is interesting to learn about him.

There is one thing he can do better than any other insect except the froghopper. A flea can jump one hundred times his own length! He can jump up to 13 inches (33 centimeters)! His long hind legs help him to do it. What a leap he must make to go so far!

If a child could jump like that, he could go as far as 400 feet in one leap! That would be fun!

Review

1. A flea has very _____ legs.
2. What insect can jump better than a flea?
3. A flea can jump up to how many inches?

The Mayfly

The little **mayfly** is a beautiful insect. Sometimes, she is called a "dayfly." That is because at one time it was thought that she had only one day to enjoy her beautiful wings. But more careful study has shown that she may remain alive somewhat longer.

The mayfly spends most of her life as a **nymph** (nĭm(p)f´), which is the larval stage of an insect that goes through **incomplete metamorphosis**. Such insects go through only three stages of change instead of four stages. These insects do not go through the pupal stage like

Giant Michigan Mayfly Adult

butterflies do. The nymphs often look like the adults they will become, but they do not have wings.

The mayfly comes out of an egg that her mother left on the top of the water. For two or three years, she swims in a pond. Her wings grow while she lives in the water. They are kept shut up in a tight case. She is getting ready for one beautiful day in the air.

When she is ready, she creeps out of the water and out of her old skin. Now she is a dainty and pretty creature. Her insides are full of air. She cannot even eat!

The mayfly does not need to live more than a day. She has only one job to do; she must lay her eggs on the water. Her life's work is quickly done.

God made so many different creatures. It is very interesting to learn about how each one lives.

Review

1. How long was it once thought a mayfly had to enjoy her wings?
2. How many stages does a mayfly go through in its metamorphosis?
3. The one job an adult mayfly must do is to lay her_____ .

Tumblebugs

Two big beetles are rolling a ball. They are sometimes called **tumblebugs**. What are they doing? Are they playing a game? They roll, push, and tug the ball with all of their might. These beetles are not playing. They are working very hard.

These tumblebugs have come to a hill. How can they get up? Push and tug! Push and tug! They are almost to the top! Oh, no! A slip—and down they go, bugs and ball to the foot of the hill. It looks very funny. Do they give up their task? No! They get up and try again.

Finally, they reach the top of the hill. Down they go, rolling over and over, on the other side. These beetles get up again and continue their task.

Why do the tumblebugs work so hard? Where are they taking the ball? What are they going to do with it?

Tumblebugs at Work

The tumblebugs made the ball all by themselves. They placed an egg inside the ball. The ball is made of food for the baby to eat when it hatches. They are going to take the ball to a safe place. They will cover it up, and the baby will be safe.

We can learn a lesson from the tumblebugs. Do not give up just because a job is hard to do. Keep working hard, and we can get the job done.

Review

1. In this story, two big tumblebugs roll, push, and tug a _____ .
2. The tumblebugs placed an _____ inside the ball.
3. When the baby tumblebug hatches, what does it eat?

The Walkingstick

Common Walkingstick

God has made so many different kinds of insects. Some of them seem very strange to us. One odd-looking insect is the **walkingstick**, or "stick insect." His name tells us what he is like. He looks almost like a stick or twig. When he walks, he looks just like his name—a walking stick!

A walkingstick has a long, slender body with two antennae and six legs. If a walkingstick loses a leg or antenna, it can grow back! Some of these insects grow to be half an inch long; others may grow up to one foot long.

Why do you think he looks the way he does? God made him that way to protect him. The walkingstick can sit very still in

a bush or a tree. His unusual shape and green or brown color match the twigs on which he lives. The way he looks protects him from birds and other creatures that like to eat insects. Since they think that he is a twig, they leave him alone. Other ways he may protect himself are by spraying a bad odor or giving off a stinging chemical. Walkingsticks like to eat berries, vines, and leaves.

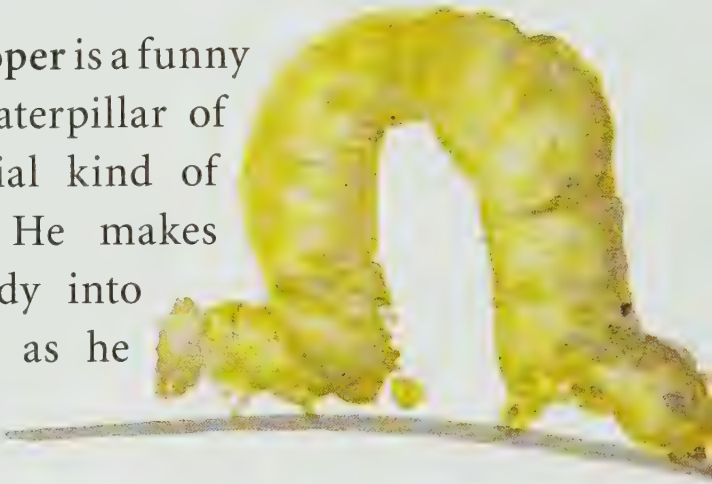
God knew the best way to make every creature. We can remember this when we see the walkingstick.

Review

1. The walkingstick looks like a stick or a _____.
2. A walkingstick has a long, slender body with _____ antennae and _____ legs.
3. Name something that walkingsticks like to eat.

A Little Gymnast

The **looper** is a funny little caterpillar of a special kind of moth. He makes his body into a loop as he walks.



Do you know why he walks that way? He has no legs in the middle part of his body. He moves by walking his back legs up to his front legs and then moving his front legs as far as his body can stretch.

When this caterpillar walks, it looks like he is measuring. He uses his own body as a ruler. That is why he is often called an **inchworm** or "measuring worm"; he is not a worm at all, but a larva of a moth.

Have you ever seen an inchworm hanging in the air? He spins a silken thread. He

lowers himself to the ground. He can also climb back up his thread.

A looper has another trick. He can hold himself to a twig using only his back legs. He stretches his body straight out to protect himself. It must be hard work! He looks almost exactly like a twig when he does it. Can you imagine why he would do that? Maybe the birds will think he is only a twig and will leave him alone. Is it not wonderful how God made the inchworm in a special way to protect himself?

Review

1. A looper makes his body into a _____ as he walks.
2. The inchworm spins a silken _____ and lowers himself to the ground.
3. The inchworm stretches his body straight out like a twig to _____ himself.

A Living Light

This little beetle flies around at night. He does not mind the dark. Why should he? He carries his own little light with him. Have you ever seen him with his little "flashlight"? You may call him a **firefly** or a lightning bug.

His light is not like fire. It does not burn him. It does not feel warm to you if you hold your hand near him. Still, he makes a bright light! He turns his light on and off as he flies. How beautiful it looks to see these little bugs flying about at night!

During the day, the firefly's body looks very plain. He has a flat body, which is dark brown or black in color with orange or yellow **markings**. We would hardly see him among so many bright-colored flowers and butterflies. At night, we cannot see the flowers and butterflies, but we can see the firefly as he does his part to make the world bright.

Review

1. A firefly carries his own little _____ with him.
2. A firefly's light is not like a _____ and does not burn him.
3. The firefly's body is dark brown or black with orange or yellow_____ .

The Dragonfly

The **dragonfly** has four beautiful wings. He has big, bright eyes. He is a large insect. He may seem a little scary, but we do not have to be afraid of him. He does not hurt people. In fact, he is good for us.

A dragonfly eats hundreds of insects each day. He likes to catch mosquitoes for his dinner. He can grab them as he flies. He holds them with his legs and crushes them with his jaws. He can dart down very quickly. He eats a lot of insects because he is so big. Dragonflies can help to keep mosquitoes from bothering animals and people.

The dragonfly often finds his dinner near a pond. There are many insects near the water. Before the dragonfly had wings, he even lived in the water.

A dragonfly goes through incomplete metamorphosis. Do you remember what

Blue Dasher Dragonfly

this means? This means it goes through only three stages of change, not four. First, a dragonfly drops its eggs in a pond or lake. When an egg hatches, a dragonfly larva, or nymph, is born. The nymph swims in the water for up to four years or so. It uses its strong mouth to catch insects. As the nymph swims, two pairs of wings grow under its skin.

One day, the nymph creeps out of the water. It sits on the stem of a water plant. Its old skin splits, and the adult dragonfly creeps out. It waits for its wings to spread out and grow strong. Its life cycle is complete.

Soon the dragonfly can fly quickly through the air. He darts here and there and catches **pesky** mosquitoes. We will not miss the mosquitoes!

Review

1. Dragonflies are helpful because they eat _____ of insects each day.
2. A dragonfly drops its eggs in a _____ or lake.
3. The dragonfly nymph swims in the water for up to _____ years or so.

A Careful Mother

Another insect mother is very different. Some people do not like her at all. She is not pretty to look at, and she does not have a pretty name, either. She is called an **earwig** (ēr′•wĭg). She likes to hide in dark, wet places, sometimes under a stone.

The earwig has two strange little wings. They fold up like a fan. She crosses one on top of the other behind her back and puts them under her wing cases. Her body is flat and slender with dark-colored markings. She also has two **pincers** (pĭn(t)′•sərs) on her back, which she uses for protection.

The earwig is different from a lot of insect mothers. We have read about bees and mayflies, who never see their own babies. The earwig does more than see her babies. She sits on her eggs like a mother hen! When the little ones hatch out, she

leads her nymphs around to find food. She takes very good care of them.

Is it not strange that there are so many different ways these little creatures have of caring for their children? There is always something new and interesting to learn about them. We could never learn all there is to know about God's wonderful creation.

Review

1. An earwig likes to _____ in dark, wet places.
2. An earwig has two _____ on her back for protection.
3. A mother earwig leads her _____ around to find food.

Unit Five

Learning About Moths

The Moth

When a caterpillar, or larva of a moth, sleeps in a brown cocoon, it is going through a great change. This is the pupal stage. When a hole appears in the side of the cocoon, it will not be a caterpillar that creeps out. It will be a **moth**!

How did the moth get into the cocoon? Where did the caterpillar go? The moth was the caterpillar! She went through a big change called complete metamorphosis. It is a miracle.

An adult moth stretches her wrinkled wings. Soon they are straight and strong. They look like soft, furry "skin." Her **feelers** look like little **fern** leaves. She

is a much prettier creature than the caterpillar used to be.

The mother moth flies away. Soon she lays some eggs on a maple leaf. Soon tiny caterpillars will hatch. One day, they will fly instead of crawl.

Review

1. The larva of a moth changes into an adult insect during the _____ stage.
2. An adult moth has feelers that look like little _____leaves.
3. The mother moth lays her _____ on a leaf.

A Hawkmoth

Hawkmoth Preparing to Drink Nectar from a Thistle Flower

What is this flying over the flowers? Is it a **hummingbird**? It looks a little like one. When it stops, we can see that this creature is not a bird. It is an insect called a **hawkmoth**. It has six legs and four wings, instead of two legs and two wings like the hummingbird. Besides, the hawkmoth does not have a beak like a bird.

The hawkmoth has a very long tongue, like a hair. He can unroll it until it is several inches long. He uses it to reach down into flowers with long nectar tubes to drink their nectar. He is as dainty about his food as is a hummingbird.

The hawkmoth was not always so dainty. He began life on a tomato vine. So he is called a **tomato hornworm**, though he is not a worm at all but the larva of the hawkmoth. He is very greedy. He also has a strange way of raising his head.

When the tomato hornworm is ready, he goes down into the ground. He does not need to make a thick cocoon to keep him warm in the winter. The earth keeps him warm. He sleeps inside a little case. There is a long stem on one side of the case. Maybe his long tongue is stored there.

When spring comes, he will creep out of his dark bed. He will begin to feed upon the flowers. The tomato hornworm is

such a plain creature. What a miracle that God made him to fly one day!

Review

1. A hawkmoth has _____ legs and _____ wings.
2. The hawkmoth uses his long _____ to drink nectar from flowers.
3. The larva of the hawkmoth is called a _____ hornworm.

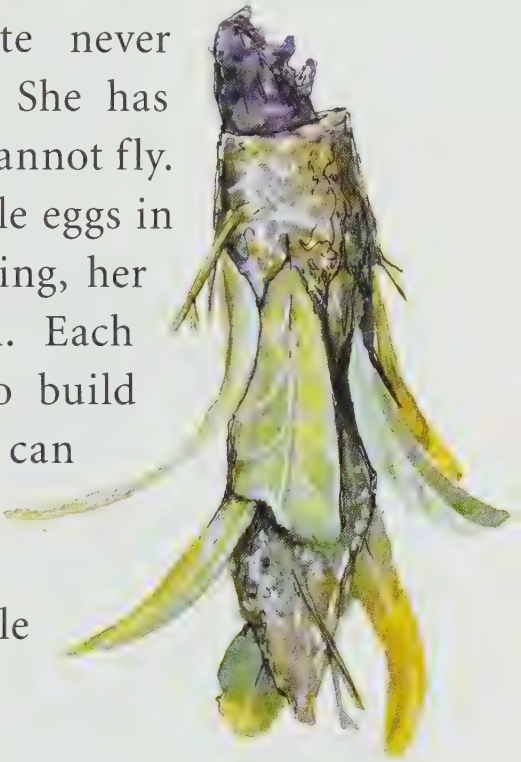
A Bag Maker

God has made many insects that have special ways of doing things. He made one little moth that knows how to build a bag. The moth lives inside the bag. This insect is called a **bagworm**.

When the moth first hatches from his egg, he is a caterpillar. He immediately begins to build a little bag right around himself. As he grows, he makes the bag bigger. He builds it by reaching out to grab bits of things from the ground or a branch. He attaches these pieces to his home. He carries his bag everywhere. When he is scared, he creeps inside and shuts the door. When he needs to eat, he crawls almost out of the bag. He always keeps a tight hold on his little home.

One day, the caterpillar falls asleep. When he wakes up, he will fly away. He has turned into a moth!

This moth's mate never leaves her home. She has no wings, so she cannot fly. She lays many little eggs in her bag. Next spring, her babies will hatch. Each one will begin to build his own bag. We can see the plan of **creation** in the lives of these little moths.



Review

1. One little caterpillar builds his home around himself like a _____ .
2. The moth's mate lays many little _____ in her bag.
3. The following spring, the babies will _____ and build their own bags.

Unit Six

Arachnida

Spiders

Have you ever seen a spider on her **web**? She is an amazing creature. Spiders belong to the family called **A r a c h n i d a** (ə•răk´•nə•də).

A spider has eight legs and two body parts—the first part includes its head and chest; the second part is its stomach. Many spiders have a gray or brown color. Other spiders have beautiful red, orange, yellow, or other colored markings.

God gave spiders a special way of doing things. They are able to spin webs out of silk. Spiders have **spinnerets** that make this silk.

Spiders' webs are very sticky. Insects fly along and do not see the fine threads. They become stuck in the spider's web. The spider eats the insects that it catches in its web. Is it not wonderful that God has made so many different and interesting creatures for us to study?

Review

1. Spiders belong to the _____ family.
2. Spiders have _____ legs and _____ body parts.
3. A spider eats the _____ that it catches on its web.

The Spider Meets a Man

A spider sits beside her web. She is waiting for an insect to get stuck on the sticky threads. But wait, a boy is coming nearby. The spider does not want to see him.

The spider shakes her web as hard as she can. Maybe she thinks this will keep him from seeing her. She is afraid that the boy will harm her.

Maybe he will, but it would be a foolish thing to do. The spider is one of our best friends. She helps us every day. She eats many insects that are harmful to people or to the plants they grow. Most spiders do not harm people, either.

Finally, the boy walks away. So the spider sits still again, waiting to catch an insect to eat.

Review

1. The spider_____ her web to keep the boy from seeing her.
2. The spider is our friend because it eats many _____ insects.

Mrs. Spider and Mrs. Wasp

Mrs. Spider sits quietly on her web. Suddenly, she sees a mud wasp flying very fast toward her. The spider is not happy to see Mrs. Wasp. Do you remember what the mud wasp brings for her babies to eat? She brings spiders!

The spider is wise enough to know that she is in danger. She drops down from her web. As she goes, she spins a line to climb back up to her web. Now she lies very still upon the ground. She has tricked the wasp.

Even if Mrs. Wasp could see the spider lying on the ground, she would not touch it. The spider is "playing dead." She is all curled up in a little ball. This will keep her safe. The mud wasp will not bother with a dead spider. She cannot give a dead spider to her babies, so off she flies.

Mrs. Spider continues to lie on the ground, playing dead. She waits until she is sure that the wasp has flown away. Finally, she climbs up her silk rope to her web. Again she sits and waits. She hopes that an insect will come flying along. If the insect does not see Mrs. Spider's web, the insect may be caught in it. That is how the spider gets her food.

Some people think that spiders are scary. Others think that they are cruel. All living things have a part in God's plan. Spiders eat insects. Even if we do not like spiders, we must be thankful that they eat many harmful insects.

Review

1. Mrs. Spider is afraid of Mrs. Wasp because the wasp babies like to eat _____ .
2. Mrs. Spider protects herself by playing _____ .
3. We must be thankful for spiders because they eat many harmful _____ .

A Spider in a Flower

There are many different kinds of spiders. One little spider does not build a web to catch her dinner. She hides in a flower instead. You cannot see her, unless you look very closely. She is almost the same color as the flower that she sits upon.

Does she know colors? How can she tell which flower looks just like her? She seems to know because she never goes to a flower of the wrong color. Why is the color of the flower so important to this spider? There are two reasons. First, the

spider does not want to be seen by her enemies. They might jump on her and carry her away.

Second, she does not wish to be seen by the little insects that come to the flower to feed. She holds still so she looks like a part of the flower. When an insect comes close enough, she can jump up and catch it for her dinner.

The Lord God is the One who gave the spider her pretty color. He also taught her to use a flower to catch her food.

Review

1. The spider is almost the same color as the _____ in which she hides.
2. The spider's enemies might _____ on her and carry her away.
3. When an_____ comes close, she jumps up and catches it for dinner.

A Spider Flies Away

A tiny spider wants to go on a long trip. She cannot drive a car. She cannot get a ride on a bus or an airplane. Instead, she uses a very special gift that God has given her. He shows her how to make her own **vehicle** to fly away!

First, the spider climbs to the top of a plant. Next, she makes her legs and her body very hard and straight. She begins to spin a lot of light, silk threads. They are so light, they float. Soon she has spun so many threads, she feels they can carry her.

She takes a little leap, and away she sails through the air. The spider is so light, the wind rushing against the many threads is enough to make her float up and away!

The spider can ride on the wind for a long way. When she wants to come down, she just rolls up her threads. Her own weight can now take her down.

Only God could plan and create such a wonderful creature.

Review

1. This spider climbs to the top of a plant and spins lots of _____ threads.
2. The wind rushing against the many threads makes her _____ up and away!
3. The spider can ride on the _____for a long way.

A Mother Spider

One mother spider is very careful with her young. Before her babies are born, she carries them around! She lays hundreds of eggs and puts them in a ball-shaped **sac**. This spider is so careful of her egg sac that she will fight to protect it. She will lose one of her legs rather than her babies. She is very brave.

When the little spiders hatch out, she still cares for them. Sometimes, they ride around on her back! The little spiders grow very fast. Soon their skins are too small for them. They grow new skins under the old skins and lose their old ones. Soon they will be able to care for themselves. Until they grow up, their mother will watch over them.

Review

1. This mother spider lays hundreds of eggs and puts them in a ball-shaped _____ .
2. The mother spider carries her babies on her _____ .
3. The babies grow fast; soon their _____ are too small, and they grow new ones.

A Spider Builds a Bridge

A little spider sits on a bush beside a brook. She wants to get across the water. She does not know how to fly or swim. There is no bridge for her to run across. The wise spider knows just what to do.

She begins to spin. Soon a soft, silk line floats gently over the stream and sticks to a bush. That is what the spider hoped would happen. If her first line does not go across the water, she tries again.

The spider runs over her silk bridge. She spins another line as she goes. At the other side, she makes the thread tight. Back and forth she goes, making her bridge stronger each time. Soon it is finished. From the beginning, God created spiders to build bridges this way.

Review

1. This spider spins a soft, _____ line that floats over the stream and sticks to a bush.
2. The spider runs over her silk _____ and spins another line as she goes.

A Spider Under the Water

Diving Bell Spider at Work

This is the story of another spider. Strange to say, this spider is a **diver.** Why would a spider want to dive? She dives to get to her home. Her home is under the water!

How can a spider live under the water? She has to have air to breathe. First, she builds a little house out of silk. Then she brings bubbles of air down with her and fills up her home.

She makes her egg sac and lays her eggs.

She raises her babies under the water. It seems like a strange way for a spider to live. God knew it would be the best way for her to raise a family.

Review

1. The diving spider lives under the_____ .
2. She brings bubbles of _____ down with her and fills up her home.
3. She raises her _____ under the water.

A Spider Under the Ground

Many spiders live in webs strung on plants and buildings. Other spiders have different ways of building their homes. We have learned about a spider that lives

Trapdoor Spider Emerging from its Underground Home

under the water and about another that lives in a flower.

There is another spider that builds her home underground. She digs a round hole down into the earth. This hardworking spider even covers the mud walls of her

home. She spins her silk and carefully lines the tunnel with it. Then she makes a door that just fits into the top of her house. She holds them together with a **hinge**. She makes the door a little larger at the top than at the bottom. This is so it cannot fall in on her. She covers the inside of this door with silk, too.

The spider cannot leave the outside of her **trapdoor** mud-colored. A bare spot of dirt in the weeds could be seen by other creatures. Birds or wasps could find the spider's home. They might kill her or her babies.

The wise spider gathers plants like those nearby. She covers her mud door with them. Now her home is very hard to find. She and her babies are safe. This special spider is often called the **trapdoor spider**.

Review

1. The trapdoor spider builds her home under the _____ .
2. The trapdoor spider lines the mud walls of the tunnel with_____.
3. The trapdoor spider covers the outside of her mud door with _____ .

The Pocket Gopher and the Bison
Live Side by Side on the Prairie.

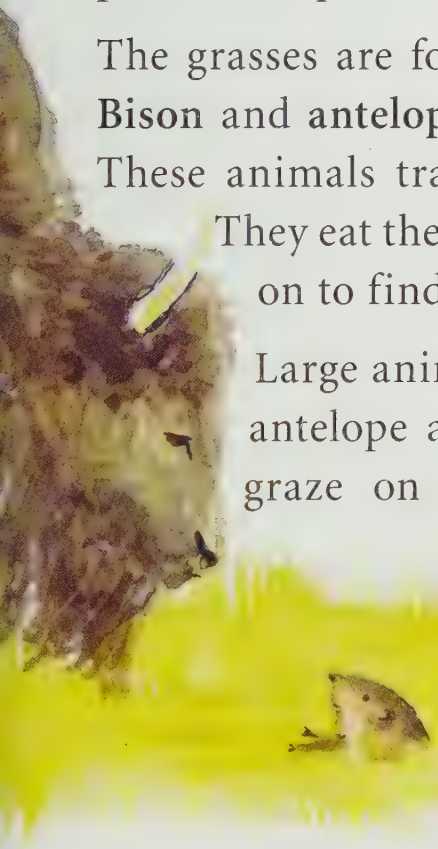
Unit Seven

Prairie and Forest Life

The Prairie

A **prairie** is a wide, flat place. For miles there are no hills or trees. Many of the plants on a prairie are tall grasses.

The grasses are food for many animals. **Bison** and **antelope** graze on the plains. These animals travel together in herds. They eat the grasses and then move on to find water or more food.



Large animals such as bison and antelope are easy to see as they graze on the plains. However, smaller creatures are not so easy to see.

Prairie dogs, gophers, rabbits, and mice live in holes, or **burrows**, in the ground. The prairie dog and the rabbit come out of their holes to eat plants.

The **pocket gopher** digs around under the ground. He gathers grass roots in his pockets. The pockets are slits on the outside of his cheeks. When he has filled his pockets, he brings the roots to his storeroom. He pushes the food out of his cheeks in the same way that you push toothpaste out of the tube!

The prairie may look still to us sometimes. That is because many of the animals that live there are under the ground!

God has made a place to fit the needs of every living thing. The plants on the prairie support many creatures, large and small.

Review

1. A prairie is a wide, flat place with tall _____ but no hills or trees.
2. Prairie_____ , gophers, rabbits, and mice live in burrows.
3. The _____ gopher puts food in slits on the outside of his cheeks.

Prairie Hunters

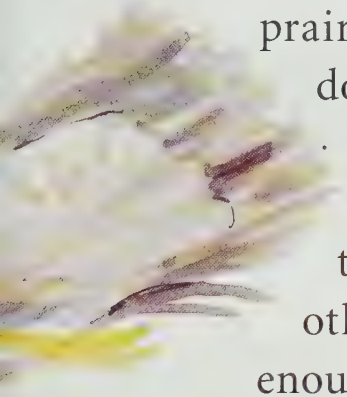
Some animals on the prairie like to eat meat. These hunters catch plant-eating animals for their food.

Red-Tailed Hawk

Prairie creatures have ways to protect themselves from the hunters. The little animals are able to hide in the ground. Their coats blend in with the earth and grasses, making them hard to see. Larger animals, such as antelopes, get away from danger by running very fast.

Far above the prairie, **hawks** fly high on the winds. God has given them very good eyesight. When they see the movement of a rabbit or a prairie dog, they dive toward

the earth. They catch their **prey** with their strong, sharp claws, called **talons.**



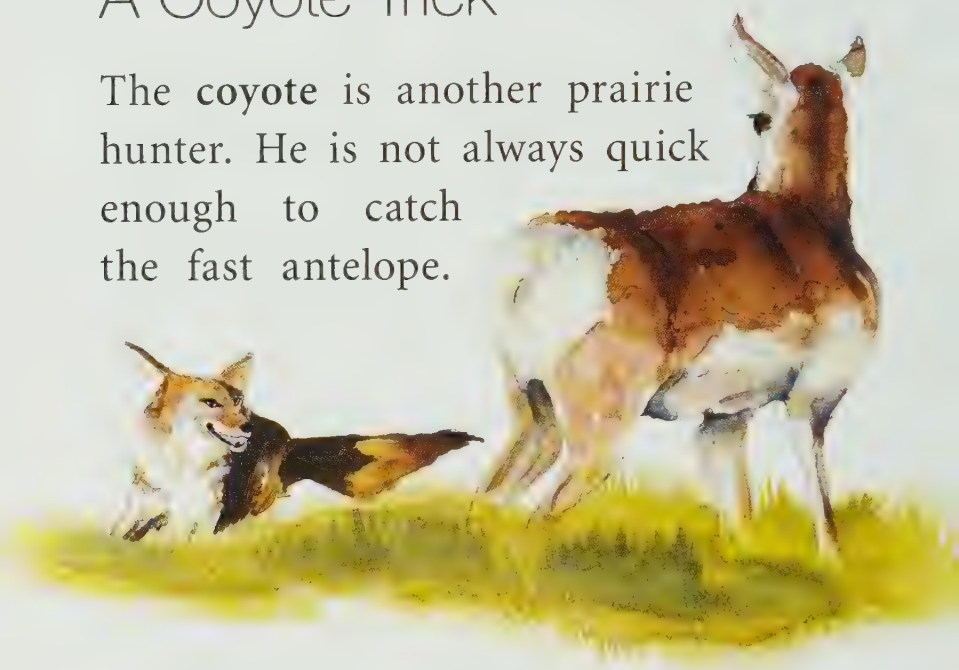
The hunters serve a purpose on the prairie. They help to keep down the number of smaller creatures. Too many rabbits and gophers could damage the prairie plants. Then the other animals would not have enough food.

Review

1. Little prairie animals protect themselves from hunters by _____ in the ground.
2. _____are an enemy of rabbits and prairie dogs.
3. _____ help to keep down the number of smaller creatures on the prairie.

A Coyote Trick

The **coyote** is another prairie hunter. He is not always quick enough to catch the fast antelope.



Several coyotes work together and use a clever trick to catch their prey.

One trick is like a relay race. The prize is an antelope! The coyotes choose one animal out of the herd. Then three or four coyotes run out into the plain and hide in the grasses.

The first coyote runs up and chases the antelope that was chosen. The antelope

is much faster and easily gets away. The coyotes have a plan. The first coyote chases the antelope toward the second coyote, hidden in the grasses. The second coyote jumps up and chases the antelope toward the third coyote. Each coyote has run for only a little way. The antelope has run for miles. Soon he is tired. One by one, the coyotes catch up to him. Together, they enjoy their prize.

Review

1. The _____ is not fast enough to catch the antelope.
2. Several coyotes work together and use a clever _____ to catch their prey.
3. The coyotes chase the antelope until it gets _____ .

A Little Actor

Gambel's Quail

One day, a little girl walked in the **meadow.** She saw a little **quail** fluttering along in front of her. She could not see where it came from.

"Poor little thing," she said. "How lame you are! You must be badly hurt. I will pick you up and see what I can do for you."

The little girl, however, could not pick up the quail. Just as she reached for the bird, it flew away.

Why did the quail act like it was hurt? It was because the quail was a mother. When she saw the girl coming near, she was afraid her babies could be hurt. She

began to limp and flutter away from her nest. When she got far enough away from her little ones, she flew away. What a clever mother! She works hard to protect her little ones.

The little girl was so busy watching the mother quail, she never saw the nest. The quail uses the same trick to fool wild animals that might harm her babies. God made her very wise.

Review

1. The mother quail pretends to be _____ to protect her babies.
2. When someone gets close to the mother quail, she _____ away.

A Beaver and a Squirrel

"Good morning, little squirrel; may I ask what you are doing?" said a beaver.

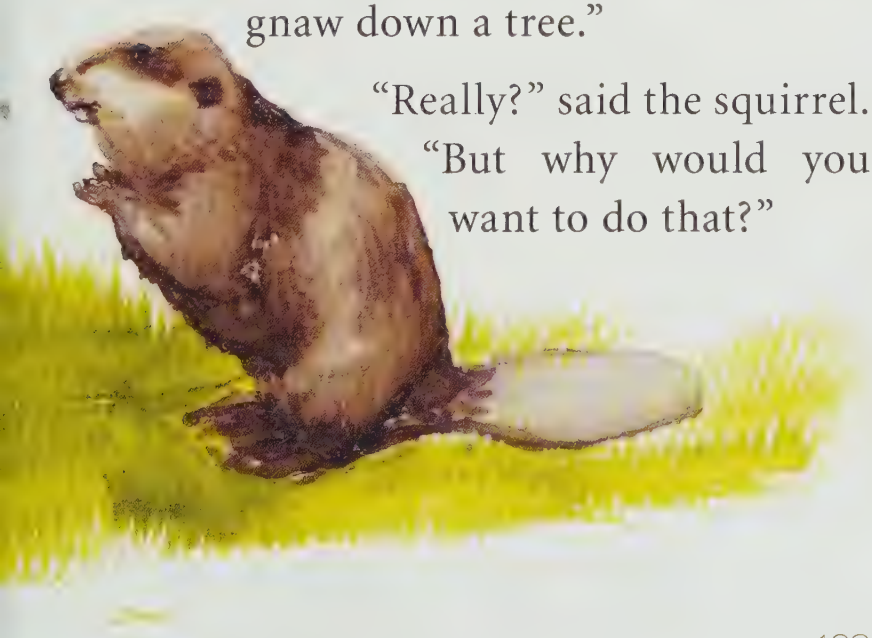
"Yes," said the squirrel. "I am working very hard to lay up my winter store of nuts."

"How do you get those nuts cracked?" asked the beaver. "You are so little; I can't believe you can do it!"

"Yes, I can," said the squirrel. "I do it with my sharp teeth. Watch me as I turn a nut over in my sharp claws and **gnaw** on it. My teeth wear away as I use them. That keeps them sharp. They keep growing all the time, so that they do not wear out."

"My teeth are like that, too!" said the beaver. "But I can gnaw much bigger things than nuts with my teeth. I can gnaw down a tree."

"Really?" said the squirrel. "But why would you want to do that?"



"Beavers need trees to make a **dam** across the water," said the beaver. "Many of us work together in the winter. We work better as a team."

Review

1. The squirrel uses his sharp _____ to crack nuts.
2. Beavers gnaw trees with their teeth to make a _____ across the water.

A Beaver Dam

"How do you make your houses?" the squirrel asked.

"Beavers make houses out of sticks covered over with mud," said the beaver.

"How do you cover them?" asked the squirrel.

"We do it with our tails. They are our **trowels**," said the beaver.

"Is that why you have such strange, flat tails?" asked the squirrel.

"Yes, it is. We could not work very well if we had such long, hairy tails as yours. Your tail is beautiful, but I do not think it does you any good," said the beaver.

"You are wrong!" said the squirrel. "My tail is so light that it bears me up when I leap from one part of the tree to another."

"I must tell you more about what we can build," said the beaver. "We like to have

the water come up over our front door. We are safer then. Sometimes, the water does not come up high enough. We have to build a dam to make it rise higher. We cut down all the trees we need. We build a dam of trees and sticks and stones, and cover it with mud. Our dam holds back the water. The pond gets deep enough to cover our door."

"How do you get into your house if the water comes over the front door?" asked the squirrel.

"We swim into it. Our hind feet are **webbed**, so they make good paddles for swimming," said the beaver. "I see that your feet are not like mine. You have sharp claws. What are they for?"

"My claws help me to cling to the tree as I climb up," said the squirrel.

"We are not much alike," said the beaver.

"No," said the squirrel. "But we are both perfectly made to do our jobs."

Review

1. Beavers build their homes out of _____ covered over with mud.
2. The beaver's feet are _____ so they can swim.
3. The squirrel uses its _____ to help it cling to the tree as it climbs.

Evening Chorus

Summer is a busy time for animals. Insects, birds, frogs, and other creatures must work hard. They gather food and build their homes. They lay eggs and care for their babies.

In the evening, you can hear the sounds made by many of these creatures. It is like an evening **chorus** (kôr´•əs). You do not have to pay to hear the music. Just step out into your backyard and listen!

Thousands of crickets chirp together like an **orchestra** (ôr´•kə•strə). Frogs call out their mating songs. Some have songs that are smooth and quiet. Others, such as the bullfrog, call out like a horn honking. You may also hear owls screeching or hooting.

In the summer, one insect even gives off light! The firefly darts around the yard. He is like a tiny flashlight turning on and off.

Enjoy the sounds and sights of a summer night. They are like a **concert** given by God's creatures.

Review

1. Crickets chirp together like an_____ .
2. The bullfrog sounds like a _____ honking.
3. Fireflies give off _____ at night.

Unit Eight

Learning About Birds

The Eagle

The bald eagle is a special bird because it is the national bird of the United States. It has a brown body and a white head. From far away, it looks like the feathers are missing from its head. That is why it is called "bald."

The eagle has a hooked beak. It has sharp, curved claws. Its wings and body are large and powerful.

The bald eagle is a sea eagle. Its home is near the water. Some eagles eat rabbits and birds. The main food of the bald eagle is fish. The eagle has very good eyesight. It can see small things as far as three miles away!

The eagle is a beautiful bird. It is good for man because it helps to control pests.

Review

1. The bald eagle is the_____ bird of the United States.
2. A bald eagle has a white head, which looks likes feathers are_____from its head.
3. Bald eagles like to eat_____ .

The Kingbird

The **kingbird** sits high on a treetop. From his **perch**, he can look everywhere. He is watching for other birds. He will fight them if he must.

Kingbird (left) and Red-Bellied Woodpecker (right)

Why would the kingbird want to fight? Is he mean? No, he has a very good reason for fighting. He and his mate made a nest in a cherry tree. The female is sitting in the nest now. The male is sitting high above. He sits there all day. He will protect his little mate. If another

bird comes, he gives a **shrill** cry. He flies after the other bird.

The other day, a **woodpecker** came to eat the cherries. The kingbird does not eat cherries. He eats insects. Even so, he would not allow the woodpecker to come near. The kingbird did not want the woodpecker to bother his mate. He flew after him. He pulled out some of the woodpecker's feathers! He was glad to get away.

The kingbird is brave. He never leaves his post. Even a **thundershower** does not bother him. He just sits there, even if he does get wet.

His mate does her part, sitting on the eggs. Soon the kingbirds will have a house full of children.

Review

1. The kingbird sits at the top of a tree to _____ his nest from other birds.
2. The female kingbird sits on the _____ .
3. The kingbird never leaves his post, even in a _____ .

The Robin

"Cheer up, cheer up—cheer, cheer!"

Mr. Robin sings a sweet song. He is not a fighter like Mr. Kingbird. Still, he does know how to protect his mate.

After Mrs. Robin builds her nest, Mr. Robin moves to a tree nearby. His bright, orange breast is easy to see. He keeps his mate safe by making others watch him—not her.

Mr. Robin's mate can hear him sing. She sits for hours on her eggs. His song keeps her from getting lonely. Mrs. Robin does not have an orange breast. She does not sing on the treetops. Her brown coat is the same color as her nest and the tree limbs. It would be hard for a cat, or some other creature, to see her.

Review

1. A male robin protects his mate by making others _____ him—not his mate.
2. The female robin sits for _____ on her eggs.
3. The female robin's coat is the same _____ as her nest and the tree limbs.

A Hummingbird

The tiny hummingbird is a beautiful creature. It is amazing to see her fly. Her wings move so quickly, they can hardly be seen. She can hover, which means she can fly in one spot, as if she were floating! The hummingbird can even fly backwards or upside down!

The hummingbird's beautiful feathers match the pretty flowers. It is hard to see her as she hovers above the blossoms. She puts her long beak into a flower and laps up nectar and insects.

The hummingbird's nest is made from leafy bits and is sometimes held together by spiders' webs. The nest is so small, it looks like a knot on the limb of a tree.

The hummingbird is so small and light, it can become caught on a **thistle**! Some insects and frogs can catch and eat these tiny birds.

Hummingbirds like to drink from tube feeders filled with sugar water. People hang these feeders in their yards. It is so interesting to watch hummingbirds fly!

Review

1. The hummingbird moves her _____ so quickly, they can hardly be seen.
2. The hummingbird puts her long beak into a flower and laps up _____ and insects.
3. Some insects and _____ can catch and eat these tiny birds.

Unit Nine

Our Great Creator

God's Tiny Creatures

God's world is full of so many different kinds of creatures. We have learned that even the tiniest insect lives its life just as Jesus made it to do.

We have learned about the amazing **skills** that God has given to many of His creatures. Some new babies know how to care for themselves from the day they are born. Many know how to build their own houses. Each one knows exactly what kind of food it needs. It knows where to find food and how to get it.

Some insect larvae know how to spin their own cocoons. They do it just in time to fall asleep. When they wake up, they have grown up like their parents.

Insects and other tiny creatures follow the same **patterns** of their parents. They are born the same way. They go through the same changes. They build the same kinds of houses. They also gather and eat the same kinds of food. They have been given the same kinds of tools. They use them in the same way that their parents did. They run or fly or crawl or walk in the same way that their parents did. We can see the plan of creation in the lives of the tiniest creatures.

Review

1. Many baby creatures know how to build their own _____ .
2. Some insect larvae know how to spin their own _____ .
3. These tiny creatures follow the same _____ of their parents.

Our Creator and Savior

The Bible tells us that God created the heaven and the earth in six days. On the fifth day, God made all the creatures of the sea and the birds of the air. On the sixth day, He made all the other animals that move over the earth.

On the sixth day, God also created man in His own **image** and said that man should rule over the fish, birds, and animals—over all the earth. After God created Adam and Eve, He put them in a beautiful garden. Many of the same animals that you learned about in this book were probably living in the garden.

At this time, God made an agreement called a **covenant** with Adam. God commanded that Adam may freely eat from any tree in the garden, but not from the tree of knowledge of good and evil. If

he obeyed God, he would live; but if he broke God's law, he would surely die.

Adam disobeyed God, and **sin** entered the world. Satan tempted Eve first; then he used her to tempt Adam. They were no longer happy and tried to hide from God. Adam felt ashamed and even blamed Eve for what he had done.

The Bible says we are sinners, too. We are like the tumblebugs. Their eggs are put in a ball of dirt, which is like sin. When they hatch, the young start eating the ball of dirt. This reminds us that we also are born in sin, and our hearts are dirty in every way.

God wants His children to be like the caterpillar that changes into a beautiful butterfly. When God calls us to be His children, the **Holy Spirit** gives us a new life. We are changed into a new creature because **Jesus Christ** died on the cross

Monarch Butterfly Emerging from its Chrysalis

for our sins. "Therefore, if anyone is in Christ, he is a new creation; old things have passed away; behold, all things have become new" (2 Corinthians 5:17).

The greatest act of creation is when God changes a son or daughter, mom or dad, into a new creation. How do you become a new creature? Jesus said, "You must be born again" (John 3:7). This means God needs to change you, just like He

changes the caterpillar into a butterfly. Everything becomes new!

"Whoever calls on the name of the LORD shall be saved" (Romans 10:13). This means you need to turn away from sin and turn to God, and to trust in Jesus who died and rose again. He will forgive your sins. Then you will be a new creature, changed by God our Creator and Jesus Christ our Savior.

—Edward J. Shewan

Review

1. God created man in His own _____ .
2. Adam disobeyed God and _____ entered the world.
3. When God calls us to be His children, the _____ gives us a new life.
4. The greatest act of creation is when God changes you into a new _____ .
5. If you turn away from your sin and trust in Jesus, He will _____ your sins.

The Maker's Gifts

Who taught the spider how to make
Her silken web so light?
Who gave her such a **cunning** way
To take her **airy** flight?

Who told the **timid** little bird
To play that she was lame,
And try to lead me far away
When near her young I came?

Who taught the little mother wasp
To make her paper nest,
And work away the summer hours
Without a thought of rest?

How does a little honeybee
Know how to make her cell,
And fill it with such dainty food
To feed her babies well?

It was their Maker gave to them
Such **wondrous skillful** ways;
He gives them all some work to do
Through all the summer days.

He gives to us, my children dear,
More skill of mind and heart;
Let us then praise Jesus Christ
And always do our part.

—*Author Unknown*

All Things Bright and Beautiful

All things bright and beautiful,
All creatures great and small,
All things wise and wonderful,
The Lord God made them all.

Each little flower that opens,
Each little bird that sings,
He made their glowing colors,
He made their tiny wings.

—Mrs. C.F. Alexander

The Boy That Never Sees

God help the boy that never sees
The butterflies, the birds, the bees,
Nor hears the music of the breeze
When **zephyrs** soft are blowing;

Who cannot in sweet comfort lie
Where clover blooms are thick and high,
And hear the gentle murmur nigh
Of **brooklets** softly flowing.

God help the boy that does not know
Where all the woodland berries grow;
Who never sees the forest's glow
When leaves are red and yellow;

Whose childish feet can never stray
Where nature doth her charms display—
For such a helpless boy, I say,
God help the little fellow.

—Author Unknown

Words You Should Know

A

airy—in the air; light as air

antelope—deerlike animals that are very fast runners, chew their food more than once, and have horns that are empty inside

antennae—sticklike parts that grow out of an insect's head; help the insect smell and are often called *feelers*

aphids—small insects that suck sweet juice from plants and produce honeydew

Arachnida—family name for spiders; has a body with two segments—the front segment (the cephalothorax) bears the eyes, mouthparts, and four pairs of legs, but no antennae; the back segment (the abdomen) bears the lungs and spinnerets, which produce silk

B

bagworm—a moth whose larvae build bag-like cases around themselves, which they carry with them; females are wingless and never leave their bag

beebread—honey or pollen used as food by bees

beehive—a place for a colony of bees to make and store honey

beetles—insects with mouthparts that are used for biting; have hard front wings that cover their soft, thin back wings when they are closed

bison—animals that look like cows but have a hairy neck, short, curved horns, and a humped back; the American buffalo

brooklets—small streams of water; little brooks

bundle—a group of things joined together

burrows—holes or tunnels dug in the ground by animals

C

caddisfly—an insect that has two pairs of hairy wings

caddisworm—the larva of the caddisfly; lives in the water and protects itself by building a case of sand, tiny stones, bits of shell, or small plant parts

carpenter bee—a solitary bee that makes its nest in solid wood; it drills long tunnels in wood and makes rooms, or cells; it lays its eggs in these cells

caterpillar—the larval stage in the life cycle of a butterfly or moth

cell—a small room built by an insect for laying eggs and storing food

chemical—material that causes a change when it is mixed with a different material

chorus—a group of singers that perform together

chrysalis—the pupa of a moth or butterfly; also the name of the hard shell that covers the moth or butterfly during the pupal stage

cicada—a large, flylike insect that has clear wings; as a nymph, it feeds on the roots of trees for seventeen years; adult male makes a loud, sharp sound that is repeated very fast

claws—the sharp nails on the foot of an animal

cocoons—the silky cases that the larvae of many insects spin around themselves; protect them during the pupal stage

colony—a group of insects that live and grow together

concert—a program with singers and/or musicians

covenant—a relationship that God sets up with us and backs up by His word

coyote—a small wolf that lives on the western prairies of North America

creation—all that God has made in the beginning, by the word of His power; He created the

world out of nothing within six days, and it was all very good.

creatures—all living things created by God that move across the earth

cuckoo bee—a bee that lays its eggs in a bumblebee hive; the bumblebees raise the cuckoo bee's young

cunning—made or done with great skill; skillful or clever

curse—the evil that God sends upon a person or a group of people for disobeying His Word

D

dainty—very fine and beautiful, and easily damaged

dam—anything that is built to stop the flow of water in a stream, river, or body of water

delicate—beautiful, fine, and easily broken or damaged

digger wasp—a wasp that digs in the earth to lay its eggs; lives and works alone

diver—a person or animal that plunges into the water

dragonfly—large insect that has narrow, clear wings; its two pairs of wings are always at right angles to its body, even at rest; eats flies and mosquitoes

drones—male bees that mate with the queen; do not work and have no sting

E

earwig—a long insect that has short, horny front wings and mouthparts used for biting; at the rear end of its body, it has a pair of large, jaw-like tools for holding things

Egyptians—people that live in northern Africa along the Nile River; during Bible times, the Israelites became their slaves after the death of Joseph around 1700 B.C.

enemies—people or things that try to hurt or harm another

F

feelers—special parts, such as *antennae,* of an insect that help it feel or smell

female—a girl or woman

fern—a plant that has leaves called *fronds* or branch-like leaves with many small leaves attached to a stem

firefly—a beetle that has wings and a soft body; back end gives off natural light, which it creates without making heat; larvae and wingless females are called *glowworms*

flea—a small insect that has a flat body, large legs for jumping, and no wings; adult fleas suck blood from *mammals* and birds [Mammals are warm-blooded animals with hairy bodies.]

flutter—to flap the wings rapidly

fungus—"plants" that produce *spores* but lack *chlorophyll*, a green substance present in green plants

G

gall—a small ball that grows on the leaves or stems of plants; this is caused by a special *chemical* left by the gall wasp

gall wasp—wasp that lays its eggs on leaves or stems of plants; the eggs or larvae cause *galls* to form

germs—very small animals or plants that can make a person sick; can only be seen with a *microscope*, an instrument used for seeing very small things

gnaw—to cut, bite, and wear away little by little with the teeth

God—the Maker of everything; there is only one true God; He is a Spirit and does not have a

body as we do; God is One, yet He is three Persons: God the Father, God the Son, and God the Holy Spirit—the *Trinity.**

greedy—wanting more and more

grub—the short, fat, wormlike *larva* of an insect

H

harmful—describes something that hurts or damages a person, place, or thing

hatch—to come out of an egg

hawkmoth—a moth with a thick, fuzzy body; long, thin wings; and a long, tubelike mouth; flies very fast and hovers when sipping nectar from flowers

hawks—birds of prey that have a hooked beak; short, rounded wings; and a long tail

hibernate—to sleep through the winter

hinge—the part that holds a door to its frame

Holy Spirit—the third Person of the *Trinity*: God the Father, God the Son, and God the Holy Spirit; the Spirit of God is the Giver of Life

honey ant—an ant that collects nectar and honeydew from plants and other insects, and stores it in special worker ants called *repletes*

* Adapted from *Catechism For Young Children*, published by Great Commission Publications.

honeybee—a bee that makes and stores honey; a common insect that lives in a beehive

honeycomb—a place made by bees to store honey; made up of many wax cells that have six sides each

honeydew—a sweet liquid that is produced by *aphids* and other such sucking insects

hummingbird—a very small American bird that is brightly colored; has a long, thin bill for drinking nectar and narrow wings that move back and forth very fast, often with a humming sound

I

ichneumon wasp—insect whose larvae feed on other insect larvae; *ichneumon* means "tracker"

image—a representation of someone or something

inchworm—same as *looper* or "measuring worm"

incomplete metamorphosis—the three stages of growth of certain insects: the egg, nymph, and the adult stage; no pupal stage

Insecta—a class name for insects; have a head with a single pair of antennae, three pairs of mouthparts, and usually a pair of compound eyes; have a thorax with three segments—

usually each segment bears a pair of legs, with a pair of wings on the second and third segments; and have an abdomen

J

Jesus Christ—the second Person of the *Trinity*: God the Father, God the Son, and God the Holy Spirit; Jesus is the Savior of the world

K

kingbird—a bird called an American flycatcher; has grayish-black feathers and a white-tipped tail

L

larva—a baby insect that hatches from an egg; wormlike creature that is sometimes called a grub, caterpillar, or maggot; *larvae*, plural of larva

leaf-cutter bee—bee that cuts circle-shaped pieces from leaves or flowers to make its nest

locust—a grasshopper that has short antennae and commonly travels in swarms

looper—type of a moth whose larva moves by looping its body; first, it moves the front end of its body and then brings up its back end to make a loop; also called an inchworm or measuring worm

M

male—a boy or man

markings—special marks or coloring that belong to an animal or plant

mate—the husband or wife of a person or animal

mayfly—an insect with a soft, delicate body and thin, clear wings; mayfly nymphs live several years in the water, but adult mayflies live only hours or a few days

meadow—a piece of grassland that is used for feeding cattle or sheep, or for growing hay

metamorphosis—the four stages of growth of many insects: the egg, the larva, the pupa, and the adult

molting—throwing off the old, outer skin to reveal new skin underneath

moth—an insect that has four wings and generally flies at night; usually smaller than most butterflies

mud wasp—a wasp that makes its house out of mud; works alone; includes the mud dauber, potter wasp, and so forth

N

nectar—sweet liquid found in many flowers; used by bees to make honey

nymph—a young insect that looks a lot like its parents when it is born; the second stage of *incomplete metamorphosis* (egg, nymph, and adult)

O

orchestra—a group that plays musical instruments together

P

paper wasp—a wasp that makes its house out of paperlike material and lives in colonies; includes the hornet, yellow jacket, and so forth

parasols—lightweight umbrellas used to shade from the sun

patterns—things that happen in the same way over and over again

perch—a place where a bird rests, usually high on a tree branch or power line

pesky—troublesome; often insects that are pests

pharaoh—the title given to the rulers of Egypt during Bible times

pincers—clawlike parts of insects and other animals; used for protection or for carrying things

pocket gopher—an animal that digs holes in the ground; is the size of a large rat and has pockets in its cheeks

pollen—yellow, powderlike cells found on flowers

prairie—a large area of grassland that is nearly flat or a bit rolling

prey—an animal hunted or killed for food by another animal

pulp—soft material produced by insects and made up of chewed bits of plant parts mixed with saliva

pupae—insects that stop feeding, make a covering, and rest so they can change into adults; *pupa*, singular of pupae

pupal stage—the third stage of complete metamorphosis; when the larva becomes a pupa and rests as it changes into an adult insect

Q

quail—a small game bird that has a short beak and nose protected by scales; it nests in grass and lays ten to fifteen white eggs at a time

queen—the female insect in a colony of bees, ants, or termites; mates and lays eggs

R

repletes—special honey ants that have the job of storing honeydew inside their bodies in a part called the *gaster*

roots—underground parts of plants that store food and absorb water

royal jelly—special food for baby queen bees

S

sac—a small pocket that is part of an animal or plant

scent—an odor left by an animal

shingle—a small, thin piece of material used to cover the roof of a house or building

shrill—very high, sharp sound that hurts the ears

silk—the threadlike material made by a spider or insect

sin—any thought, word, or deed that breaks God's law

skillful—having or showing *skill*; having much training and knowledge in some special work; also spelled *skilful*

skills—special abilities to do something well; this ability comes from talent, training, or practice

skin—the outer covering of a person or animal

social—living and working together

solitary—living and working alone

spin—make silk thread; a spider or insect *spins* by pushing out a liquid that hardens in the air

spinnerets—small parts of a spider or insect that spin the silky threads

stems—main trunks of plants that form buds and shoots

swarm—a large number of bees, led by a queen, that are leaving the hive to start a new colony; a large group of insects

T

talons—claws of a bird of prey

thistle—a plant that has a flowery head and prickly leaves

thundershower—rain that comes with lightning and thunder

timid—easily frightened; not sure of oneself; shy

tomato hornworm—the large, green larva of the hawkmoth; feeds on tomato plants

tracker—an animal that carefully follows the *tracks* or footprints of another animal; a hunter

trapdoor—a door that covers or hides an opening

trapdoor spider—an arachnid that makes a trapdoor over the opening of its house

trowels—tools that have a flat blade with a handle; used to put plaster or similar material on wood, stone, or brick

tumblebugs—beetles that roll balls of dung and bury them in the soil; female tumblebugs lay their eggs in or on these balls; when the larvae hatch, they grow up in these balls

tunnel—a hole made under the ground for animals to live in or lay eggs

V

vehicle—something (such as a car, bus, train, or plane) used to transport people or things

W

walkingstick—an insect that has a long, sticklike body with no wings; feeds on plants

wax—solid, yellow material that is made by bees to build the cells of a honeycomb

weather—what the air is like outside at a certain time and place (hot or cold, wet or dry)

web—the threads of a spider or insect that are spun to look like a net

webbed—having the fingers or toes connected by a weblike material

wondrous—filled with *wonder*; causing praise to God for what He has done

woodpecker—bird that clings on the sides of trees and pecks the bark

worker—female that does the work in a colony of bees, ants, or termites

Z

zephyrs—west winds; soft, gentle breezes

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